In The Claims:

Claim 1. (Currently Amended) A switch controller inside a switch device capable of easing network congestion, the switch controller has a plurality of ports and the switch device further includes a shared buffer and a plurality of physical layer devices (PHY), the shared buffer can be divided into a plurality of buffering units, the switch controller comprising:

a buffer control device coupled to the shared buffer for assigning and releasing the buffering units;

a plurality of port control devices coupled to the physical layer devices and the buffer control device, wherein each port control device has a one-to-one correspondence with the ports, the port control device that corresponds to a source port receives a network packet and then sends the packet to at least one of the buffering unit(s) for storage;

a forwarding control device coupled to the port control devices, and a target port of the packet is determined according to a header of the network packet; and

a queue control device coupled to the port control devices and the buffer control device, wherein the queue control device further includes a plurality of output queues, each output queue has a one-to-one correspondence with the port control devices, ~~each output queue has a number of reserved buffering units,~~ and the buffering unit for storing the packets is linked to the output queue corresponding to the port control device at a target port;

wherein each output port has a number of reserved buffering units which are not used by any other output port, and the source port triggers or terminates a congestion mode to control the

number of free buffering units in response to the number of reserved buffering units in the output queue.

Claim 2. (Currently Amended) The switch controller of claim 1, wherein a kth port is the target port and a plurality of parameters are defined as follows:

$Q[k]$: length of the output queue of the kth port;

R_{max} : number of maximum buffering units reserved for each port;

$R[k]$: number of buffering units reserved for the kth port,

$$R[k] = 0 \text{ when } R_{max} <= Q[k]; \text{ and}$$

$$R[k] = R_{max} - Q[k] \text{ when } R_{max} > Q[k].$$

Ψ : the total number of reserved buffering units, i.e., $\Psi = \sum_{k=0}^{n} R[k]$;

Φ : number of free buffering units;

C : the number of reserved buffering units in [[the]] a virtual free space;

Ω : number of virtual free buffers,

when $\Phi <= C$, $\Omega = 0$, and when $\Phi > C$, $\Omega = \Phi - C$;

W : minimum number of reserved virtual buffering unit;

wherein the congestion control mode is triggered when $\Omega <= \max\{\Psi, W\}$ and $R[k] = 0$.

Application No.: 09/821,428   Docket No.: JCLA5383

Claim 3. (Original) The switch controller of claim 2, wherein the number of reserved buffering unit in virtual free space C is 10, and the lowest number of reserved buffering units in virtual free space W is 28.

Claim 4. (Original) The switch controller of claim 1, wherein a kth port is the target port and a plurality of parameters are defined as follows:

$Q[k]$: the output queue length of the kth port;

R_{max} : the greatest number of buffering units reserved by the port;

$R[k]$: the number of buffering units reserved by the kth port,

when $R_{max} <= Q[k]$, $R[k] = 0$, and

when $R_{max} > Q[k]$, $R[k] = R_{max} - Q[k]$;

wherein the congestion control mode for the k_{th} port is triggered when any of the other ports has already triggered a congestion control mode and $R[k] = 0$.

Claim 5. (Original) The switch controller of claim 1, wherein each port control device includes:

a receive medium access control device coupled to one of the physical layer devices, wherein the received medium access control device inspects any incoming network packet for errors, if no errors is found, the packet is accepted, otherwise the packet is returned;

a receive control device coupled to the receive medium access control device, the queue control device and the buffer control device, the receive control device issues requests to the

Page 4 of 16

buffer control device to assign at least one buffering units(s) for storing the packet and signals the

queue control device to request queuing to the corresponding output queue;

an output control device, coupled to the queue control device and the buffer control

device for outputting the packet from the output queue, and releasing the buffering units after the

buffer control unit has sent out the packet;

a transmission medium access control device coupled to the output control device and

one of the physical layer devices for outputting the packet to the physical layer device, and when

the congestion control mode is triggered, the transmission medium access control device within

the port control device that corresponds to the source port sends out a control signal to execute

the congestion control operation; and

a physical layer control device coupled to the transmission medium access control device

and one of the physical layer devices, receiving a plurality of state signals from an external

network device to select a proper congestion control mode.

Claim 6. (Original) The switch controller of claim 5, wherein the controller further

includes a CPU port capable of connecting with a CPU for a two-way data transmission via an

ISA/IDE interface.

Claim 7. (Original) The switch controller of claim 5, wherein the congestion control

mode includes a backpressure control mode, a drop control mode and a flow control mode.

Application No.: 09/821,428   Docket No.: JCLA5383

Claim 8. (Original) The switch controller of claim 7, wherein the backpressure control

mode is selected when the external network device operates in a half-duplex mode without flow

control capability.

Claim 9. (Original) The switch controller of claim 7, wherein the drop control mode is

selected when the external network device operates in a full-duplex mode but without flow

control capability.

Claim 10. (Original) The switch controller of claim 7, wherein the flow control mode is

selected when the external network device operates in a full-duplex mode with flow control

capability.

Claim 11. (Currently Amended) A method for easing data transmission congestion in a

switchdevice switch device having a plurality of ports, the switch device includes a shared buffer

capable of dividing into a plurality of buffering units, comprising the steps of:

providing a plurality of output queues, wherein the output queues have a one-to-one

correspondence with the ports, and each output queue has a number of reserved buffering units;

assigning the buffering units in the shared buffer;

receiving a packet from a source port and storing the packet in an assigned buffering unit;

determining the target port of a network packet according to a header of the packet;

linking buffering unit containing the stored network packet to the output queue that

corresponds to the target port; and

controlling free buffering units according to a number of reserved buffering units in the

Page 6 of 16

Application No.: 09/821,428   **Docket No.: JCLA5383**

output queue and a triggering or a terminating condition of the source port;

wherein each output port has a number of reserved buffering units which are not used by any other output port.

Claim 12. (Currently Amended) The method of claim 11, wherein a kth port is the target port and a plurality of parameters are defined as follows:

$Q[k]$: length of the output queue of the kth port;

R_{max} : number of maximum buffering units reserved for each port;

$R[k]$: number of buffering units reserved for the kth port,

$R[k] = 0$ when $R_{max} <= Q[k]$; and

$R[k] = R_{max} - Q[k]$ when $R_{max} > Q[k]$

Ψ : the total number of reserved buffering units, i.e., $\Psi = \sum_{k=0}^{n} R[k]$;

Φ : number of free buffering units;

C : number of reserved buffering units in [[the]] a virtual free space;

Ω : number of virtual free buffers,

when $\Phi <= C$, $\Omega = 0$, and when $\Phi > C$, $\Omega = \Phi - C$;

W : minimum number of reserved virtual buffering unit;

wherein a congestion control mode is triggered when $\Omega <= \max \{\Psi, W\}$ and $R[k]$

$= 0$.

Claim 13. (Original) The method of claim 12, wherein the number of reserved buffering unit in virtual free space C is 10, and the minimum number of reserved buffering units in virtual free space W is 28.

Claim 14. (Original) The method of claim 11, wherein a kth port is the target port and a plurality of parameters are defined as follows:

$Q[k]$: length of the output queue of the kth port;

R_{max} : number of maximum buffering units reserved by the port;

$R[k]$: number of buffering units reserved by the kth port,

$R[k] = 0$ when $R_{max} <= Q[k]$; and

$R[k] = R_{max} - Q[k]$ when $R_{max} > Q[k]$;

wherein a congestion control mode is triggered when any one of the port has already triggered a congestion control mode and $R[k] = 0$.

Claim 15. (Currently Amended) The method of claim 11, wherein a plurality of parameters are defined as follows:

Φ : the number of free (unassigned) buffering units;

C : the number of reserved buffering units in [[the]] a virtual free space;

Ω : the number of virtual free buffers,

when $\Phi <= C$, $\Omega = 0$, and when $\Phi > C$, $\Omega = \Phi - C$;

when $\Phi = 0$, the congestion control mode is triggered.

Application No.: 09/821,428   Docket No.: JCLA5383

Claim 16. (Currently Amended) The method of claim 11, further including following steps:

outputting the network packet from the target port;

releasing the buffering unit after the network packet is output; and

selecting [[the]] a type of congestion control in response to an external network device.

Claim 17. (Original) The method of claim 16, wherein the congestion control mode includes a backpressure control mode, a drop control mode and a flow control mode.

Claim 18. (Original) The method of claim 17, wherein backpressure control mode is selected when the external network device operates in a half-duplex mode without flow control capability.

Claim 19. (Original) The method of claim 17, wherein the drop control mode is selected when the external network device operates in a full-duplex mode but without flow control capability.

Claim 20. (Original) The method of claim 17, wherein the flow control mode is selected when the external network device operates in a full-duplex mode with flow control capability.

Application No.: 09/821,428   Docket No.: JCLA5383

In The Specification:

Please amend the paragraph beginning at line 15 of page 11 as follows:

--[[switchFig.]]Fig. 3. is a diagram showing the connectivity of private output queues for controlling data congestion in a switch controller according to this invention. Each port of the switch controller of this invention has a private output queue. When a packet is received from one of the ports, the packet is sent to the private output queue. As shown in Fig. 3, the largest packet Ethernet capable of receiving is usually 1518 bytes (not including preamble and SFD columns). Hence, each buffer must have a size of at least 1.5KB. To request a buffer space, a signal is sent to a buffer control device so that a buffer is linked to the output queue. After the packet is forwarded and the storage space is emptied, linkage between the queue and the buffer is released and the associated buffer becomes free. For example, the queue in Fig. 3 is linked to four buffers.--

Please amend paragraph beginning at line 11 of page 18 as follows:

--Fig. 7 is a block diagram showing the connection of the switch controller of the Ethernet switching device according to this invention. As shown in Fig. 7, the Ethernet switching device 100 includes an switch controller 110, a static random access memory unit 120, a plurality of physical layer devices 130, an electrical erasable programmable read only memory (EEPROM) 140 and a central processing unit (CPU150). Size of the static random access memory unit 120 may [[bedetermined]]be determined by the jumpers. The controller 110 is coupled to the CPU150 port via a medium independent interface (MII). The controller 100 has a CPU port that couples with another CPU 150 port via an ISA/IDE interface line. In the meantime, the controller 110 is connected to a plurality of physical layer devices 130 through a reduced medium independent interface (RMII). RMII reduces pin out number so that the 14 pins of the MII can be reduced to just six.--

Application No.: 09/821,428   Docket No.: JCLA5383

Please amend the paragraph beginning at line 23 of page 18 as follows:

--Fig. 8 is a block diagram showing the electrical connection of the switch controller according to this invention. As shown in Fig. 8, the switch controller 110 includes a plurality of port control devices 114, a queue control device 113, a forwarding control device 111 and a buffer control device 112. The plurality of port control deice 114 are coupled to the plurality of physical layer devices (PHY) 130 and a plurality of external signals. Through these physical layer devices 130, a plurality of state signals is received from the connection devices on the other end. These state signals include duplex mode and flow control capability signals. According to the flow control enable (Flow_Control_En) signal, the drop control enable (Drop_Conrol_En) signal and the backpressure enable (Backpressure_En) signal, the congestion control mechanism used by the switch controller 110 is selected. The flow control enable signal, the backpressure enable signal and the drop control enable signal can be determined by jumpers. The plurality of state signals generates a plurality of flow control window (XOFF_Window[9:0]) signals to the queue control device 113. According to the flow control window (XOFF_Window[9:0]) signals and the external signals, the selection of drop control is decided whether the drop-triggering signal DROP_ON[9:0] should [[beenabled]]be enabled.--

Page 11 of 16

Application No.: 09/821,428   Docket No.: JCLA5383

<u>In The Drawings</u>:

Please substitute the attached clean drawing of Fig. 5 for the pending drawing of Fig. 4. The amended portion is the replacement of the term "UNCONGESTED REGION" for the term "UNCONGEDTED REGION".

Page 12 of 16